CLAIMS

What is claimed is:

1. An audio signal derived bias supply for use with an electrostatic loudspeaker having at least one stator and a diaphragm, comprising:

(a) at least one transformer, adapted to receive an audio signal, and having a primary winding, and primary connection taps;

(b) a secondary winding, magnetically coupled to the primary winding, having at least two secondary connection taps, wherein the at least one stator is connected to at least one secondary connection taps;

(c) a bias circuit, connected to at least one secondary connection tap, and having a bias return, wherein the bias circuit biases the diaphragm, the bias circuit further comprising:

(i) at least one rectifier; and

(ii) at least one voltage limiter, coupled to the rectifier.

2. The bias supply as in claim 1 wherein the at least one rectification means includes at least one rectifier and at least one capacitor to form a voltage multiplier which is connected to the at least one secondary winding.

3. The bias supply as in claim 2 wherein the at least one voltage limiting means consists of a shunt regulator.

4. The bias supply as in claim 3 wherein the shunt regulator consists of at least one zener diode and at least one capacitor.

5. The bias supply of claim 4 wherein the at least one capacitor is in parallel with the at least one zener diode.

6. The bias supply as in claim 4 wherein the secondary winding further comprises at least one additional secondary winding that provides a voltage greater than the secondary signal voltage that appears on the secondary winding, wherein the bias circuit is connected to the at least one additional secondary winding.

7. The bias supply as in claim 1 wherein the bias circuit is adapted to receive a power signal from more than one transformer, and configured to supply a bias voltage to more than one electrostatic loudspeaker diaphragm.

8. The bias supply as in claim 7 wherein the bias circuit is adapted to supply a bias voltage to more than one diaphragm.

9. The bias supply as in claim 1 wherein a resistance is connected between the rectification means and the voltage limiting means.

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10. The bias supply as in claim 1 wherein a resistance is connected between the rectification means and the one secondary winding.

11. The bias supply as in claim 1 wherein the at least one rectification means further comprises a voltage multiplier having at least two rectifiers and two capacitors, wherein the at least one voltage limiting means is connected to the voltage multiplier through at least one resistor.

12. The bias supply as in claim 1 wherein the voltage limiting means further comprises:

(1) a plurality of zener diodes in series;

(2) a capacitance connected in parallel with the plurality of zener diodes; and

(3) an electrostatic membrane coupled to the capacitance and plurality of zener diodes.

13. The bias supply as in claim 1 wherein the voltage limiter is connected to the electrostatic diaphragm through a resistor.

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14. A power supply for biasing a diaphragm and at least one stator in an electrostatic loudspeaker system comprising:

(a) a power supply;

(b) an amplifier, coupled to the power supply, and adapted to receive an audio signal;

(c) a transformer, connected to the amplifier to receive the audio signal, the transformer having primary and secondary windings;

(d) a bias supply, coupled to the transformer to receive power from the secondary windings of the transformer, and to output a bias voltage to the diaphragm; and

(e) wherein the amplifier is configured to supply a charging signal separate from the audio signal, and the charging signal can be applied to energize the bias supply when no program signal is present.

15. The electrostatic loudspeaker system as in claim 14 wherein the charging signal is activated upon an initial power up of the amplifier.

16. The electrostatic loudspeaker system as in claim 14 wherein the charging signal is activated when the voltage of the diaphragm falls below a pre-determined level.

17. The electrostatic loudspeaker system of claim 14 wherein the charging signal is activated upon activation of the electrostatic loudspeaker system.

18. The electrostatic loudspeaker system of claim 14 wherein the charging signal is an ultrasonic signal.

19. The electrostatic loudspeaker system of claim 14 wherein the charging signal is a subsonic signal.

20. The electrostatic loudspeaker system of claim 14 wherein the charging signal is below an operating frequency range of the electrostatic loudspeaker.

21. The electrostatic loudspeaker system of claim 14 wherein the charging signal results from the startup charging of the power supply of associated active electronics.

22. The electrostatic loudspeaker system of claim 14 wherein the electrostatic loudspeaker is used as a transducer in a parametric loudspeaker, the parametric loudspeaker further comprising modulation electronics to provide a carrier signal output, wherein the source of the charging signal is the carrier signal output.

23. An audio signal derived bias supply for use with an electrostatic loudspeaker having at least two stators and a diaphragm, comprising:

(a) at least one transformer, adapted to receive an audio signal, and having a primary winding and primary connection taps;

(b) a secondary winding, magnetically coupled to the primary winding, having at least two secondary connection taps, wherein the at least two stators are connected to the at least two secondary connection taps;

(c) a bias circuit, connected to at least one secondary connection tap, having a bias return, wherein the bias circuit biases the diaphragm, the bias circuit further comprising:

(i) at least one rectification means; and

(ii) at least one voltage limiting means, coupled to the rectification means.

24. The bias supply as in claim 23 wherein the at least one rectification means includes at least one diode and at least one capacitor to form a voltage multiplier which is connected to the at least one secondary winding.

25. A method for charging a diaphragm of an electrostatic loudspeaker, comprising the steps of:

(a) receiving an audio signal into a primary winding of a transformer;

(b) stepping up a voltage of the audio signal to a higher voltage through at least one secondary winding of the transformer;

(c) rectifying the audio signal voltage to produce a rectified voltage;

(d) applying a voltage limiter to the rectified voltage to produce a regulated voltage; and

(e) supplying the regulated voltage to at least one diaphragm of the electrostatic speaker to power the at least one diaphragm.

26. The method as in claim 25 wherein step (c) further comprises the step of rectifying the audio signal voltage using at least one rectifier and at least one capacitor to form a voltage multiplier which is connected to the at least one secondary winding.

27. The method as in claim 25 wherein step (c) further comprises the step of applying a voltage limiting means using a shunt regulator.

28. The method as in claim 25 wherein step (c) further comprises the step of applying a voltage limiting means with at least one zener diode and at least one capacitor.

29. The method as in claim 25 wherein step (c) further comprises the step of applying a voltage limiting means with at least one zener diode and at least one capacitor in parallel.

30. The method as in claim 25 wherein step (c) further comprises the step of applying a resistance before the voltage limiter.

31. The method as in claim 26 wherein step (b) further comprises the step of applying a resistance before rectification means and the one secondary winding.

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32. A method for biasing the diaphragm of an electrostatic loudspeaker system, comprising the steps of :

(a) stepping up a voltage of an audio signal coupled to a transformer to a higher voltage through at least one secondary winding of the transformer;

(b) rectifying the audio signal voltage from the transformer to produce a rectified voltage;

(c) applying a voltage limiter to the rectified voltage to produce a regulated voltage;

(d) supplying a charging signal separate from the audio signal to energize a bias supply and a diaphragm before a program signal begins; and

(e) transferring the regulated voltage to the diaphragm of the electrostatic speaker to bias the diaphragm.

33. The method as in claim 32 wherein step (d) further comprises the step of applying the charging signal upon initial power up of an amplifier.

34. The method as in claim 32 wherein step (d) further comprises the step of applying the charging signal upon activation of the electrostatic loudspeaker system.

35. The method as in claim 32 wherein step (d) further comprises the step of applying a charging signal which is an ultrasonic signal.

36. The method as in claim 32 wherein step (d) further comprises the step of applying a charging signal which is a subsonic signal.

37. The method as in claim 32 wherein step (d) further comprises the step of applying a charging signal which is below an operating frequency range of the electrostatic loudspeaker.

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38. An audio signal derived bias supply for use with an electrostatic loudspeaker having at least one stator and at least one diaphragm, comprising:

(a) at least one transformer, adapted to receive an audio signal, and having a primary winding, and primary connection taps;

(b) a secondary winding, magnetically coupled to the primary winding, having at least two secondary connection taps and a bias return, wherein the at least one diaphragm is connected to at least one secondary connection tap;

(c) a bias circuit, connected to at least one secondary connection tap and the bias return, to bias the at least one stator, the bias circuit further comprising:

(i) at least one rectifier; and

(ii) at least one voltage limiter, coupled to the rectifier.

39. The bias supply of claim 38 wherein the at least one diaphragm is at least two diaphragms, wherein the at least two diaphragms are each connected to at least one secondary connection tap.

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